

C L A I M S

[1] A process chamber cleaning method in a substrate processing apparatus configured to perform a predetermined process on a target substrate

5 accommodated in a process chamber, the method comprising:

at least one cycle of alternately performing an operation of generating plasma of a gas containing oxygen within the process chamber, and an operation of
10 generating plasma of a gas containing nitrogen within the process chamber.

[2] The process chamber cleaning method according to claim 1, wherein the plasma has an electron temperature of 2 eV or less.

15 [3] The process chamber cleaning method according to claim 1, wherein the plasma is generated by microwaves supplied into the process chamber through a planar antenna having a plurality of slots.

[4] The process chamber cleaning method according
20 to claim 1, wherein the gas containing oxygen is oxygen gas and the gas containing nitrogen is nitrogen gas.

[5] The process chamber cleaning method according to claim 1, wherein the predetermined process performed in the substrate processing apparatus is a nitriding
25 process or oxidizing process.

[6] A computer readable storage medium containing software used for a substrate processing apparatus

configured to perform a predetermined process on a target substrate accommodated in a process chamber, wherein the software, when executed by a computer, controls the apparatus to clean the process chamber by
5 at least one cycle of alternately performing an operation of generating plasma of a gas containing oxygen within the process chamber, and an operation of generating plasma of a gas containing nitrogen within the process chamber.

10 [7] A substrate processing apparatus comprising:
a process chamber configured to accommodate a target substrate;

a processing mechanism configured to perform a predetermined process on the target substrate within
15 the process chamber;

a plasma generation mechanism configured to generate plasma within the process chamber to clean an interior of the process chamber; and

a control mechanism configured to control the
20 plasma generation mechanism,

wherein the control mechanism controls the plasma generation mechanism to clean the process chamber by at least one cycle of alternately performing an operation of generating plasma of a gas containing oxygen within
25 the process chamber, and an operation of generating plasma of a gas containing nitrogen within the process chamber.

[8] The substrate processing apparatus according to claim 7, wherein the plasma has an electron temperature of 2 eV or less.

5 [9] The substrate processing apparatus according to claim 7, wherein the plasma generation mechanism comprises a planar antenna having a plurality of slots, a microwave generation source, and a waveguide configured to guide microwaves from the microwave generation source to the planar antenna, so that
10 microwaves are supplied through the waveguide and the planar antenna into the process chamber.

[10] The substrate processing apparatus according to claim 7, wherein the gas containing oxygen is oxygen gas and the gas containing nitrogen is nitrogen gas.

15 [11] The substrate processing apparatus according to claim 7, wherein the processing mechanism is configured to perform a nitriding process or oxidizing process on the target substrate.

[12] A substrate processing method comprising:
20 cleaning a process chamber by at least one cycle of alternately performing an operation of generating plasma of a gas containing oxygen within the process chamber, and an operation of generating plasma of a gas containing nitrogen within the process chamber;

25 then, seasoning the process chamber by at least one operation of generating plasma of a gas containing oxygen or generating plasma of a gas containing

nitrogen within the process chamber; and

then, installing a target substrate into the process chamber and performing a predetermined process on the target substrate.

5 [13] The substrate processing method according to claim 12, wherein the predetermined process performed on the target substrate is a nitriding process or oxidizing process.

10 [14] The substrate processing method according to claim 13, wherein the seasoning is arranged to generate plasma of a gas containing nitrogen where the predetermined process performed on the target substrate is a nitriding process, and the seasoning is arranged to generate plasma of a gas containing oxygen where the
15 predetermined process performed on the target substrate is an oxidizing process.

 [15] The substrate processing method according to claim 12, wherein the plasma is set to have an electron temperature of 2 eV or less.

20 [16] The substrate processing method according to claim 12, wherein, in cleaning the process chamber, low electron temperature plasma is generated by microwaves supplied into the process chamber through a planar antenna having a plurality of slots.

25 [17] The substrate processing method according to claim 12, wherein, in cleaning the process chamber, the gas containing oxygen is oxygen gas and the gas

containing nitrogen is nitrogen gas.